

# COAL MINING

UNIVERSITY MICROFILMS  
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ANN ARBOR, MICH

November, 1956

Volume 33, No. 11

## YOU KNOW when you see these tractors!

You know that coal is being stripped as rapidly and economically as possible.

You know that production will continue without interruptions for downtime.

You know the mine operator will earn all of the increased profits inherent in the use of today's finest modern equipment.



Allis-Chalmers HD-21 moving over burden at Pott's Coal Co., Gypsy, Pa.



Allis-Chalmers HD-21 cleaning surface of stripped coal at Hinchman Coal & Coke Co., Zelienople, Pa.

*Highway*

HIGHWAY EQUIPMENT COMPANY

6465 Hamilton Ave. • Pittsburgh 6, Pa.

ALLIS-CHALMERS • GENERAL MOTORS DIESEL ENGINES  
MASTER • INTERNATIONAL VIBRO-TAMPERS • JAEGER  
MICHIGAN TRACTOR SHOVELS AND EXCAVATOR CRANES  
POWER-PACK CONVEYORS • GAR WOOD • ERIE BINS  
LIMA SHOVELS, CRANES, DRAGLINES • THOR



# Unequalled Power...

# More Work-ability



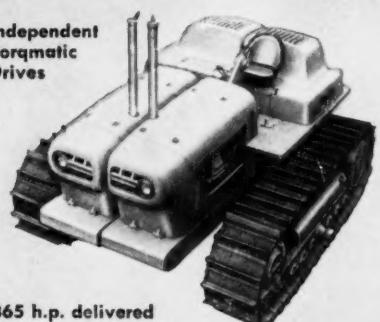
with the  
**"Euc" TC-12**  
Twin Crawler Tractor

Here's a completely new concept of tractor design and performance...the TC-12 Twin-Power Euclid. It's designed and built to deliver more power, easy operation and greater work-ability—plus exceptionally fine accessibility for servicing. Power train components are matched and job proved with years of dependable performance in heavy earth moving equipment.

Powered by two 194 h.p. engines with separate Torqmatic Drives, the TC-12 gives a smooth, steady flow of power to meet every job requirement. There's no master clutch and no manual gear shifting. Three speed ranges in forward and reverse are available by simply moving a selector lever...top travel speed is 8.3 m.p.h. The TC-12 has good stability and traction on rough ground because each half of the tractor is separate and free to oscillate...the two halves can be easily separated for shipment. Write for detailed specifications.

EUCLID DIVISION, General Motors, Cleveland 17, Ohio

Independent  
Torqmatic  
Drives



Tremendous power, speed and maneuverability make the TC-12 a top performer in heavy duty mine and quarry work. No other tractor matches its production in stripping overburden, clearing, stockpiling, building haul roads, and other big tractor jobs.

For lower cost per ton or yard...

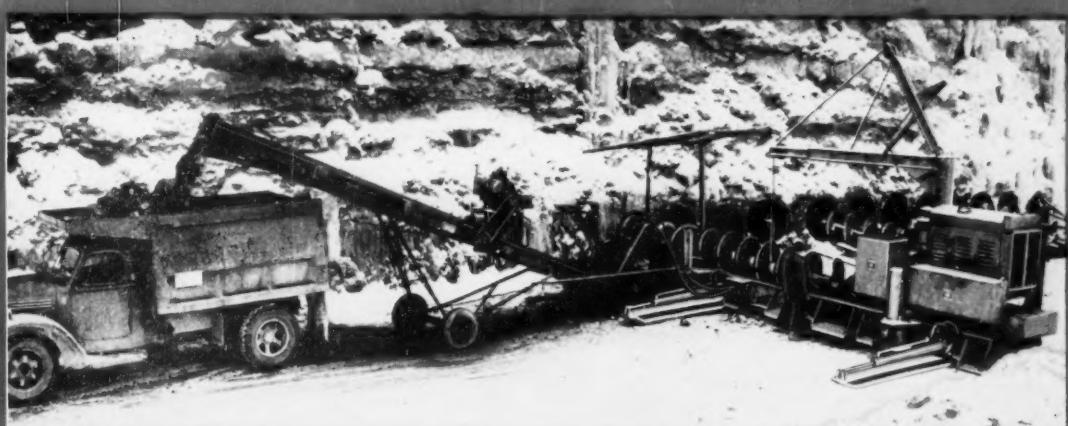
Euclids are your best investment



# Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE





## McCarthy AUGER DRILLS

- 60 TO 75 TONS PER HOUR
- SELF-MOVING FROM HOLE TO HOLE
- 2- OR 3-MAN CREW
- MINES HIGH-QUALITY COAL

• Twelve models of McCarthy Coal Recovery Drills auger-mine bonus coal at THE LOWEST operating cost per ton. They operate easily in narrow strip pits. Hydraulic controls simplify alignment, augering and changing position. Let us recommend the right cost-saving model for your property. Write for Bulletin M-101 and M-102.



### SELF-PROPELLED

Horizontal Earth and Rock Boring Auger Drills  
150 ft. Drilling Depth

- The self-propelled unit permits speedy, economical blast-hole drilling from hole to hole. It takes just a few seconds to disengage the power unit from the auger drive shaft, change position, and begin drilling again. The unit is easily attached to the McCarthy truck-mounted earth and rock boring drills now in use.

#### FINGER-TIP CONTROL



**HEAVY**  
Gives Desired Rotating Speed Of Auger



### TRUCK-MOUNTED

Horizontal Earth and Rock Boring Auger Drills

150 ft. Drilling Depth

- Truck-mounted horizontal drills are highly versatile. The drilling unit mounts lengthwise or crosswise on the truck bed for spotting hole locations faster. Drilling height from the ground ranges from 4½ to 7 ft. Four separately operated levelling jacks permit close alignment. Write for Bulletin M-105.

#### HYDRAULIC FEED



Provides Any Speed Up To 8 Feet Per Minute Horizontal Feed Of Drill

### RUGGED



### HEAVY-DUTY VERTICAL

Model 106-24—World's Fastest Heavy-Duty Vertical Auger Drill

- Bores vertical blast holes faster than any other auger drill. New gear reduction permits slower auger rotation for drilling larger holes deeper in harder rock formations. Augers 8" and 9" dia. drill holes to depths of 125 ft. for use of new type explosives. Controls can be placed at rear and auger racks can be furnished if desired. Write for Bulletin M-100.



### POWERFUL

MANUFACTURED BY  
**THE SALEM TOOL COMPANY**  
763 SOUTH ELLSWORTH AVE. • SALEM, OHIO, U. S. A.



## Rugged Stripping Conditions?

### On the Tough Jobs You'll Find Manitowoc!

When rough stripping conditions keep your balance sheet light on the profit side, look to the big capacity Manitowoc Model 4500 for economical coal stripping. For stripping operations that pay off you want a machine with a relatively low investment; that can be easily assembled and serviced by ordinary mechanics, far from metropolitan areas; and one that is mobile enough to move easily from one isolated job site to the next. With the Manitowoc Model 4500 you get all these advantages plus the big capacity production of a 5½-yd. shovel or 6-yd. dragline.

#### Ready For Rugged Conditions

Rolling, rocky terrain having steep grades and overburden of various depths is typical rugged stripping country. Here's where a Manitowoc 4500 really earns its salt! That's because a 4500 will handle unusually steep grades easy as a "cat" . . . and it has the long reach and steady stability to eliminate excessive re-handling of overburden.

#### Superior Features For The Tough Jobs

With the Manitowoc 4500 you get a big production unit having the speed and mobility of a small rig.

6-Yd. Manitowoc Model 4500 dragline strips overburden 7 days a week for Jenkins Coal Company, Earlington, Ky.

Unmatched stability assures a long reach at full bucket capacities with less ground pressures. Elimination of several electric motors and miles of intricate wiring and connections affords more efficient utilization of power. No trailing cable to restrict mobility on the job — allows operations far from power source. Transport between jobs on railroad cars or highway trailers is simple and fast — days shorter than units of comparable capacity. Available as 6-yd. dragline and 5½-yd. shovel with standard or high-lift booms.

Your Manitowoc distributor has all the facts on the profit-making 4500 — see him now for the full story.  
**MANITOWOC ENGINEERING CORP.**  
MANITOWOC, WIS.

**BASSLER EQUIPMENT CO.**  
FORTY FORT, PA.

**ANDERSON EQUIPMENT CO.**  
BRIDGEVILLE, PA.

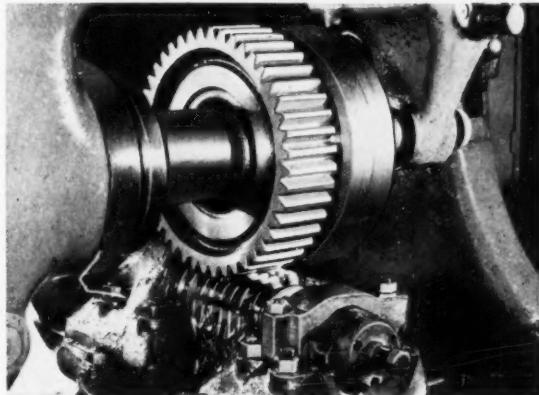
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# Your Allis-Chalmers equipment deserves True Original Parts

Why? Because they meet design, manufacturing, inspection and packaging standards that assure long life . . . budget-stretching low-cost operation.



**DESIGNED WITH THE ORIGINAL EQUIPMENT.** Each Allis-Chalmers True Original Part benefits from a fine metallurgical research program. Each is designed by experienced engineers to do its full share of the work . . . just as each component in your Allis-Chalmers machines did when this equipment was new.



**PRODUCED ON MODERN MACHINES BY SKILLED CRAFTSMEN.** Here's where modern manufacturing equipment and know-how combine to produce precision parts. This combination is the reason you can be sure of getting full work power from any Allis-Chalmers equipment in which True Original Parts are used.



**CAREFULLY INSPECTED FOR PRECISION FIT.** Every Allis-Chalmers part goes through rigid original-equipment inspection processes and testing routines. Gears are checked many times — for perfect meshing, true balance, full capacity.



**PROPERLY PACKAGED FOR LASTING PROTECTION.** Many are specially treated to protect against rust and dust. Others are safety-packed to guard against nicks, scratches or handling damage.

*True Original Parts are available at your Allis-Chalmers Construction Machinery dealer—where factory-trained servicemen are on hand to help you at all times.*

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

**ALLIS-CHALMERS**



# How Bucyrus-Erie Bonus Quality Helps You Cut Costs, Increase Output



This is the Bucyrus-Erie 38-B shovel that won praise from its owner in this stripping operation near Oliver Springs, Tenn.

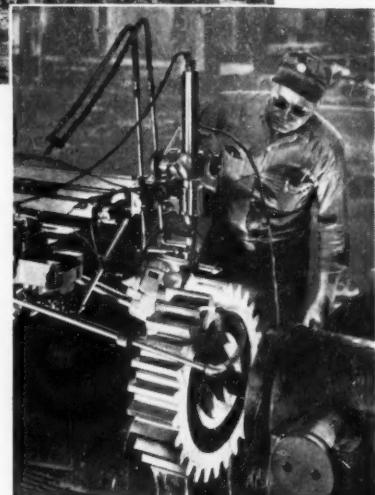
To discover the real advantages of Bucyrus-Erie Bonus Quality put a Bucyrus-Erie shovel to work in your pit. That's what Chas. Walls and Sons, Oliver Springs, Tennessee did.

Walls' job was to strip four feet of sandstone and 25 feet of shale and dirt to get at the coal in a mine near Oliver Springs, Tenn. The complete job involves excavation of 1,200,000 yards of overburden. After putting a Bucyrus-Erie 1½-yd. 38-B to work for a year, Walls commented, "Excellent service, strongest built of any shovel of its rated capacity."

"Strongest built" is just a part of the advantages of Bonus Quality. Not only do you get design and construction that adds years of life and keeps maintenance costs low, but there's extra performance value, too. There is high-speed operation that delivers big output. There is dependability that keeps big output coming day after day.

When you plan to add a shovel to your operations, be sure to get the story of Bonus Quality from your Bucyrus-Erie Distributor. Remember to see him soon.

243E56

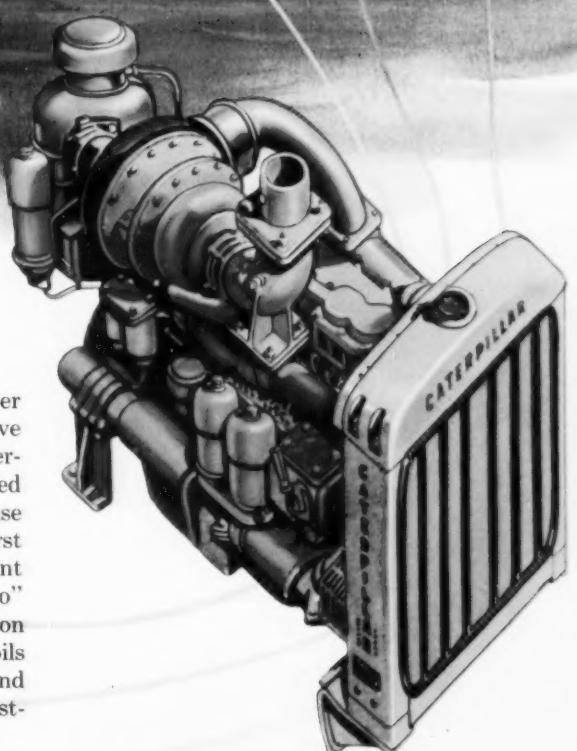


**Bonus Quality** Bucyrus-Erie uses highest quality steel, then flame hardens it to bring you gears and pinions that wear long, keep costs low.

**BUCYRUS  
ERIE**

South Milwaukee,  
Wisconsin

**WHAT YESTERDAY MEANS  
TO YOU TODAY...**



Since 1931, when Caterpillar created mobile diesel power with the first diesel crawler tractor, construction men have learned to depend on Caterpillar for diesel engine leadership. For more than a quarter-century, Caterpillar has led the field in major diesel engine developments—first to use individually-replaceable, adjustment-free fuel pumps • first to use capsule-type injection valves • leader in development of steel-backed aluminum bearings • pioneer in "Hi-Electro" hardened wet-type cylinder liners • stainless steel piston protector • leader in the development of detergent oils —those and many other firsts in diesel engine design and manufacture are evident today in the record-breaking, cost-cutting performance of Caterpillar Diesel Engines.

**A Quarter Century of Diesel Leadership by CATERPILLAR**

## **TODAY... the only Diesel Engine built specifically for construction equipment**

Look inside a Caterpillar Diesel Engine today and you'll find many more reasons why Caterpillar Diesel power is the standard by which all diesels in the construction industry are measured:

- "Hi-Electro" hardened and Superfinished crankshaft journals assure long life • helical gears provide quiet operation • aluminum alloy pistons with chrome-faced rings resist wear • wet-type cylinder liners are full-length cooled for proper heat dissipation • generous water passages maintain uniform temperature • full flow oil filters protect vital engine parts • fuel injection system eliminates field adjustments • precombustion chamber assures clean burning of low-cost high output fuels.

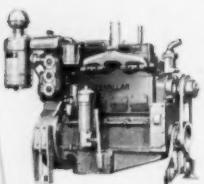
Along with all of these quality features, Caterpillar Diesel Engines give you smooth idling • lugging ability to handle tough loads • freedom from adjustments • positive starting • long service life with low maintenance costs and smooth operation without smoke. Caterpillar is the only full line equipment manufacturer to build engines for the complete line of prime movers.

What does this mean to you as a construction equipment owner today? It means that Caterpillar Diesel Engines are better today than they have ever been in the past—that they will perform many thousands of hours with a minimum of maintenance. This means more profit for you.

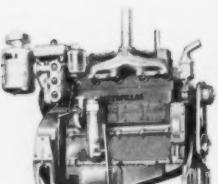
# **CATERPILLAR**

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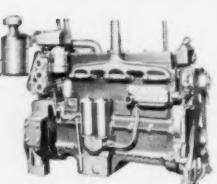
The  
world famous line  
of dependable  
**CATERPILLAR**  
Diesel Engines



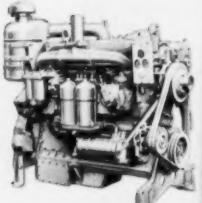
D311 — 65 HP†



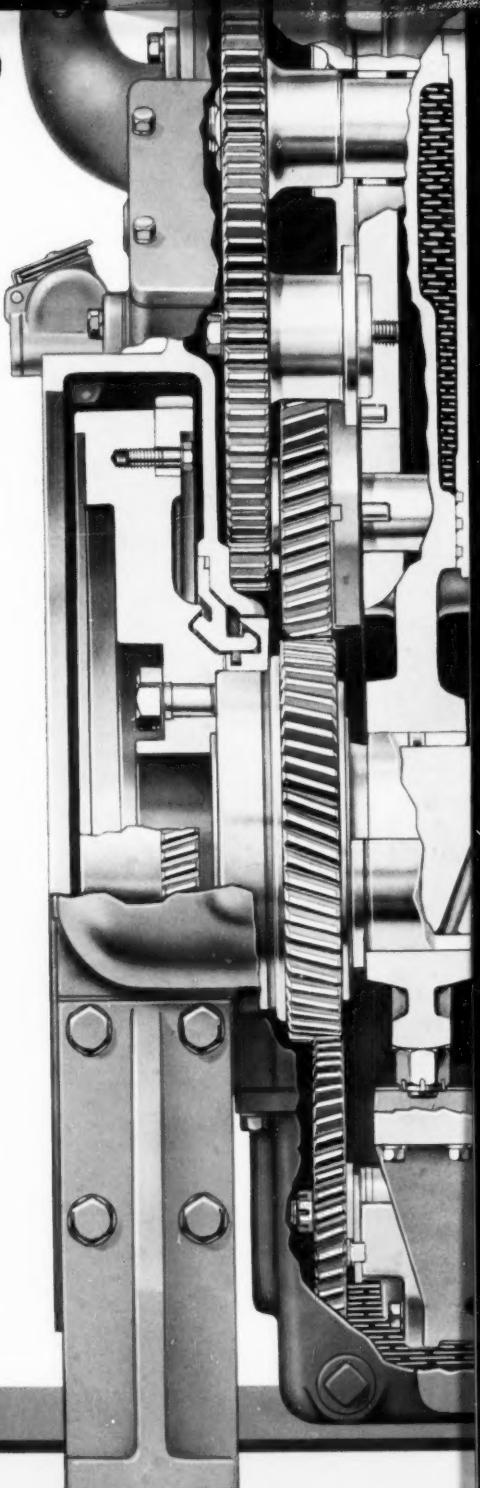
D315 — 91.5 HP†

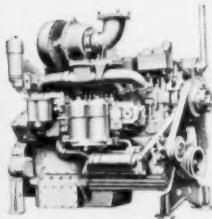
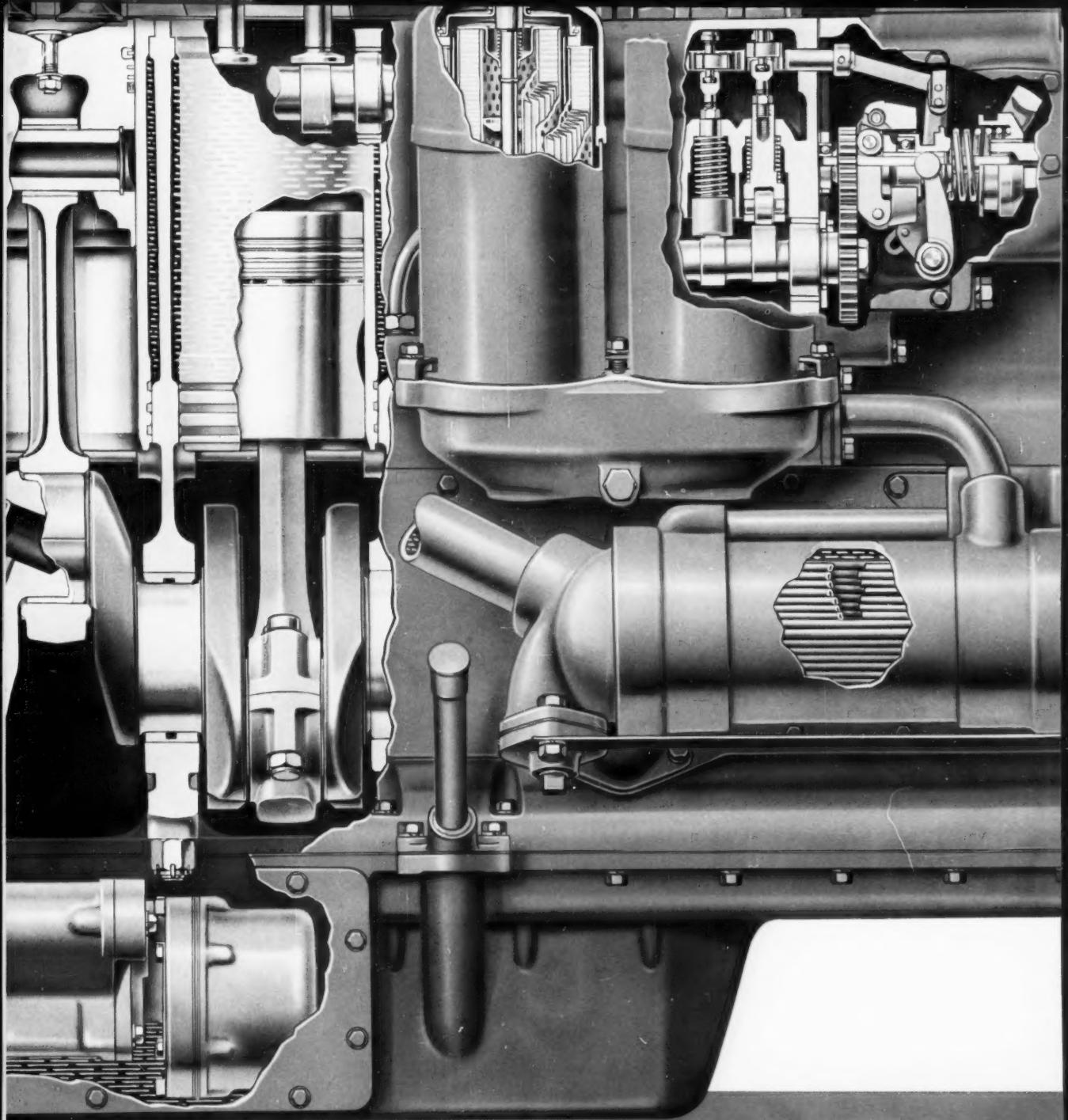


D318 — 137 HP†

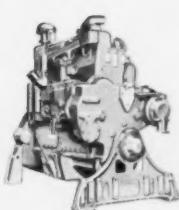


D326 — 200 HP†

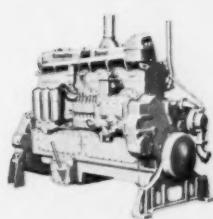




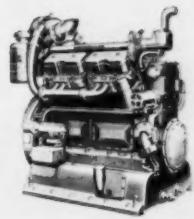
D337 - 310 HP†



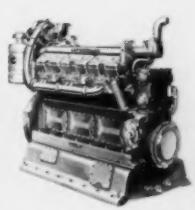
D339 - 140 HP†



D342 - 210 HP†



D375 - 430 HP†



D397 - 650 HP†

†(Maximum Output Capacity)

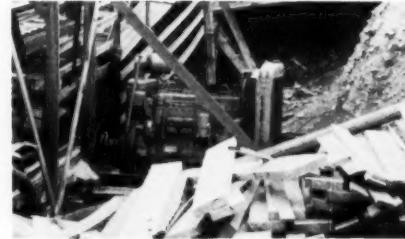
# POWER

# ...OR REPOWER

It will pay you to standardize on dependable Caterpillar Diesel Engines for all of your power requirements. Leading manufacturers of construction equipment offer their products with Caterpillar Diesel Engines as original power. These manufacturers know that the proven dependability of these engines means better performance, lower maintenance and greater customer acceptance for their products.



OLD UNITS  
GET  
NEW LIFE



Get rid of those obsolete or worn-out units that are wasting profits for you. Repower with Caterpillar Diesel Engines. Take advantage of their economy and burn low-cost fuels that give you maximum power at lowest cost. Rid yourself of those expensive-to-maintain engines that feed on premium quality diesel fuels or gasoline. Give your equipment the highest possible work output . . . more hours of continuous duty, more years of life. There is a Caterpillar Diesel Engine to fit your power requirement.

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HEADQUARTERS FOR

CATERPILLAR

DIESEL POWER

Printed in U.S.A.

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# COAL MINING

Volume XXXIII November, 1956 No. 11

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Published by  
**Modern Mining Publishing Company**

4575 Country Club Drive  
 Pittsburgh, Pa. Phone TU. 1-9411

P. F. JASIK, Publisher and Editor

Philadelphia Representative  
 PAUL S. KEISER  
 1729 Ridgeway Road Havertown, Pa.

Printed by ADVANCE PRINTING & LITHO CO.  
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Femco systems were first in the mines and are today first in quality and dependability. Get the facts. Submit your problem for a proposal.

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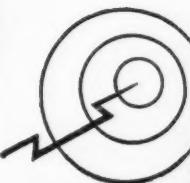
Most widely used communication for underground haulage.

### AUDIOPHONES

Finest communication between control points in cleaning plants.

### CONTROLS

Save time and money by remote control of pumps, fans, sub-stations, etc.



**Femco Inc.**  
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Made To Withstand High Drilling Speed, Whip And Torsional Strain Of Electric Drills



Drills holes faster — Will not snap off shank or chip points — Outlasts four or five ordinary augers.

THE SALEM TOOL COMPANY

SALEM, OHIO, U.S.A.



Helical and Worm Gears for Joy 14BU Loaders  
 BRONZE, HELICAL and WORM GEARS  
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 Lee Supply Co.  
 Charleroi, Pa.

Ohio Valley Mine Supply Co.  
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U.S.B.M. APPROVED PORTABLE PUMP

70 G. P. M.	20 Ft. T. D. H.
$\frac{3}{4}$ H. P.	230 Volt D. C.
Overall Length, 30" & 50"	

**HAROLD C. LUSK CO.**  
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# Do You Know? Here and There in the Coal Industry

Creation in the laboratory of functioning glands or other organs for the human body to replace those removed because of disease may "ultimately" be achieved, Dr. Virginia J. Evans of the National Cancer Institute, Bethesda, Md., predicted here at the Decennial Review Conference on Tissue Culture.

Rejuvenation by transplanting suitable laboratory-grown glands would even seem a possibility, although Dr. Evans did not mention this.

Replacement of failing human hearts by laboratory-grown ones would also seem a possibility.

Without specifying what organs might be created in the laboratory, Dr. Evans did point to the fact that tissue for repair operations is "badly needed."

Cultivation of functioning gland tissue in the test tube for implantation, she also said, "deserves concentrated effort in the near future."

The new kind of spare parts for the human body now foreseen will be built from pure strains of cells grown, or cultured, in the laboratory. The gland or stomach or kidney will not necessarily have the characteristic shape and form of the natural organ, but will be able to function in the same way.

These laboratory created spare parts will be achieved through advances in the field of tissue culture, which has already provided the means of growing polio virus for vaccine production.

A better understanding of cancer and how it arises can also come, Dr. Evans pointed out, from study of living cells cultivated outside the body. Cancer, she said, seems in one sense to be a disturbance between the interrelated chemical processes of the cancer cells and those of the normal body cells. When the normal and the cancer cells are cultivated in the laboratory, scientists can learn exactly what chemicals are needed to nourish

W. M. Ritter Lumber Co., after more than 50 years in Columbus, Ohio, will move effective Dec. 1 to 4841 Williamson Road, Roanoke, Va. An announcement by James W. Damron, chairman of the board, said the move was advisable because "Roanoke is nearer and more centrally situated to our mineral, forests and plant operations."

R. L. Ireland, chairman of NCA's Land and Water Use Committee has announced the appointment of an advisory group to assist the Committee members in land, water, reclamation and other problems to be considered. The Land and Water Use Advisory Committee will be headed by L. E. Sawyer, manager of the Indiana Coal Association, replacing A. J. Christensen, Illinois Coal Strippers Association, who was chairman for the past two years. The other members of the Committee who are technical experts in their fields, and selected to represent the various coal producing areas with land and water situations, are:

Larry Cook, Ohio Reclamation Association; L. I. Cothorn, Jewell Ridge Coal Corp.; John M. Crowl, Kentucky Reclamation Association; James Deane, Peabody Coal Co.; Hugh D. Faust, Southern Coal and Coke Co; Frank Halstead, The New River Co.; A. D. Henry, Powhatan Mining Co.; C. F. Irwin, Pittsburg & Midway Coal Mining Co.; Robert T. Laing, Central Pennsylvania Coal Producers Association; Franklin H. Mohney, Mineral Producers Association of Pennsylvania; Harry A. Sutter, Western Pennsylvania Coal Operators Association, and Harry L. Washburn, Consolidation Coal

Co. (W. Va.). G. Don Sullivan of NCA's staff will act as staff assistant to both the Land and Water Use and the Land and Water Use Advisory Committees.

B. W. Whitfield, III, of Harlan Colliers Coal Co., Brookside, Ky., was elected president of the Harlan County Coal Operators' Association. Joe Stras of the Kentucky Cardinal Coal Corp., Cardinal, Ky., was elected vice president. George S. Ward continues as secretary of the Association. Members of the executive board are Pearl Bassham, Kenes C. Bowling, John A. Brown, S. J. Dickenson, S. A. Fox, Charles S. Guthrie, L. P. Johnson, D. A. Perkins, R. C. Scott, Jr., E. B. Taylor, and A. F. Whitfield, Jr.

J. S. Laird, vice president of Gay Mining Co., was elected president of the operators' Association of Williamson, W. Va. R. D. Jones, general superintendent of the Kentland-Elkhorn Coal Co., was elected vice president, and L. E. Tierney, Jr., president of Eastern Coal Corp., was reelected treasurer. Joseph J. Ardigo was again elected executive secretary.

Lewis Stein, president of the Elliot Coal Mining Co. of Philipsburg, Pa., has been awarded the 1956 individual Benjamin Rush award by the Centre County (Pa.) Medical Society. The award recognized Mr. Stein as a community leader who has spent much time and personal income to improve the health, welfare, morale and spiritual welfare of the people of his area. Mr. Stein is president also of Builders' Supply Co. and vice president of Stein Construction Co.

each kind of cell. They can learn, also, how each kind of cell affects the chemicals it lives in by just living and growing.

Slices of tissue, such as now cultivated in the laboratory, do not give as much basic information as needed for solving problems of growth, both normal and cancerous. This is because the tissue slices are a mixture of cells. The food requirements and food handling of cell mixtures are probably different from that of the individual cells in the mixture.

Steps toward learning food requirements of individual cells have already been taken. Skin cells in pure strain from a 65-year-old man have been growing and reproducing rapidly for four months on a diet of known chemical without any protein, Dr. Evans reported.

Another pure strain of mouse skin cells has been kept in a state of relatively rapid growth and reproduc-

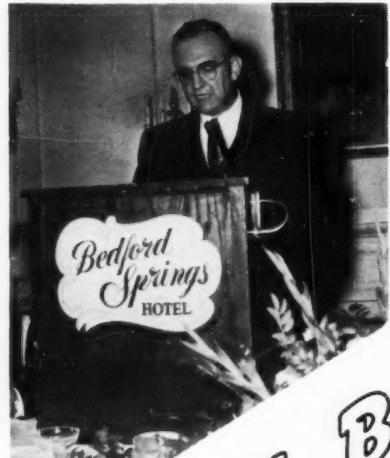
tion for more than 21 months on chemicals without protein.

Once such cells, all the same kind, can be kept alive and reproducing in the test tube on a particular diet, scientists can add one by one other foods, to see how the cells handle these. The process, on a very small scale, is like that through which requirements for different vitamins have been learned. In both cases a basic diet is worked out and then substances added one at a time to see how the one extra substance affects the animal or the cell.

"Many if not most of the advances in animal nutrition have been motivated by sociologic and economic demand," Dr. Evans stated. "Tissue culture nutrition has now reached a stage of development where the same strong forces that have been seen in the development of animal nutrition will influence the future trends in nutrition of animal cells *in vitro*."



This Model 728 Page Dragline owned by W. P. Stahlman Coal Co. at Cresson, Pennsylvania is the largest coal stripping unit in the Northwestern Coal Stripping Field. It is powered by a  $12\frac{1}{2} \times 16$  Page Diesel Engine developing 890 hp at 450 rpm. The Boom is 150 feet long and handles a 12 yard bucket. The unit is capable of digging rock overburden with very much less drilling and shooting required by a 5 yard dragline.



Congressman John P. Saylor, Democrat  
Addressing the banquet.



Robert T. Laing, Executive Secretary, addressing the banquet.  
Heath Clark, Pres., Rochester & Pittsburgh Coal Co. left, and Tom  
Pickett of the National Coal Association at speakers' table.



Left: Geo. T. Atkins, Howard A. Shaw, Lew Robbins, Fred Tush,  
George Dunchuck, Wm. Todhunter, R. T. Todhunter, Sr., H. Hamilton,  
all with The Barnes & Tucker Co.



Central Pa. Coal Producers Assn. and  
National Coal Association

Left to right: Edward Connor, George L. May, Donald Lambing, all with the Bethlehem Mines Corp.; Olen E. Conrad, Allegheny Ludlum Steel Corp.; M. J. White, Bill Beck, Jerome White, all with the Bethlehem Mines, Corp.; Lawrence Jones, Penna. Dept. of Mines.



# the Eastern Bituminous Coal Assn.

At the speakers' table, left: W. A. Jones, retired; Frank Smith, General Council; J. I. Whally, Senator; J. William Wetter, retired.

Left: Henry Ghezzi, Preparation Manager; E. H. Pauley, Supt. Maryland No. 2 Mine; E. H. Stull, Supervisor Maintenance; R. G. Phahler, Supt. Construction; John Botlock, Electrical Supt.; Wm. R. Woods, all with the Berwind-White Coal Mining Co.

Left: Edward Steidel, Chairman Federal Mine Safety Board of Review; W. R. Cunningham, Deputy Director, State Dept. of Mines; Dean E. Osbourn, Pennsylvania State University; Wm. F. Haman, Coordinator for Solid Fuels, Office Minerals Mobilization, Dept. of Interior.

at Bedford Springs, Pa.



Left: Charles A. Owen, President, Imperial Coal Corp. and T. Reed Scollon, Chief, Division of Bituminous Coal, U. S. Bureau of Mines, Dept. of Interior, Washington, D. C.

The discipline of competition acts to accelerate industrial progress.

Competition will not permit management to squander the time of those who compose its working force any more than it will permit management to squander the facilities at its disposal.

The increased output per man in all industry is the result of a growing use of science and technology.

Continued mechanization of the coal industry is mandatory. Princi-

ple considerations must be a steady advancement of technological progress leading to automation. Our progress is dependent upon technological competence. Loss of any major segment of our mechanical skill would have far-reaching effects over the entire industrial scene.

The rapidity and character of our advancements depend on the well trained, highly skilled manpower.

Ability to make proper decisions at the right time is self directed and a creation of a gifted mind.

Keyed to its objective directed by intuition, controlled by reason, the mind can see the course to follow.

Every error in judgement is paid for sooner or later. Accuracy avoids pitfalls.

Machines designed by skill and brain must come to the coal industry to allow it to meet its competition.

Organizations like The Central Pennsylvania Coal Operators Association and the Eastern Bituminous Coal Association are formed to meet competition.

Addressing the banquet Congressman Saylor outlined his platform for a congressional program of Research for Coal to protect its stability, more and better mine mechanization, looking into railroad cost and control of imported fuel oil, both obstacles to the coal industry and stressed the advisability of looking further into pipe line transportation of coal.

Newly elected officers of the organizations follow:

### THE CENTRAL PENNSYLVANIA COAL PRODUCERS' ASSOCIATION

AND

### EASTERN BITUMINOUS COAL ASSOCIATION

ALTOONA, PA.

**PRESIDENT**  
William H. Ritter

**VICE-PRESIDENT**  
Ralph H. Moore

**EXECUTIVE DIRECTOR AND SEC.**  
Robert T. Laing

**TREASURER**  
Walter A. Jones

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	Walter S. Williams Moshannon Smithing Coal Corp. Ramey, Pa.

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Ralph H. Moore C. A. Hughes & Company Cresson, Pa.	W. S. Weer Loyal Hanna Coal & Coke Company Philadelphia, Pa.
John Barnes Mull Barnes & Tucker Company Philadelphia, Pa.	J. William Wetter Rockhill Coal Company Philadelphia, Pa.
Charles A. Owen Imperial Coal Corporation New York City	R. W. Wigton The Morrisdale Coal Mining Company Philadelphia, Pa.
	Harold W. Woolridge Woolridge Coal Company Clearfield, Pa.



J. E. Elkins, Manager Mines, Duquesne Light Co., explaining the atom to the audience.

GENERAL ANNUAL  
4th MEETING  
*and*  
BANQUET  
*of the*  
MINING ELECTRO-  
MECHANICAL MAINTENANCE  
ASSOCIATION



Left: R. S. James, U. S. Bureau of Mines and President of the Association; M. J. Mechling, Valley Camp Coal Co. and First V-President of the Association; C. S. Conrad, Consolidation Coal Co.; D. C. Jones, Pennsylvania State University and Fred J. Bucher, Emeral Coal Co.

Left: W. E. Schroeder, V-President, Schroeder Brothers; R. H. Jamison, President, Belmont Fuel Co.; James Lyons, Lyons Cable Repair Service; Harry Young, Cook-Wilson Co.; George Stacey, Master Mechanic, Duquesne Light Co.



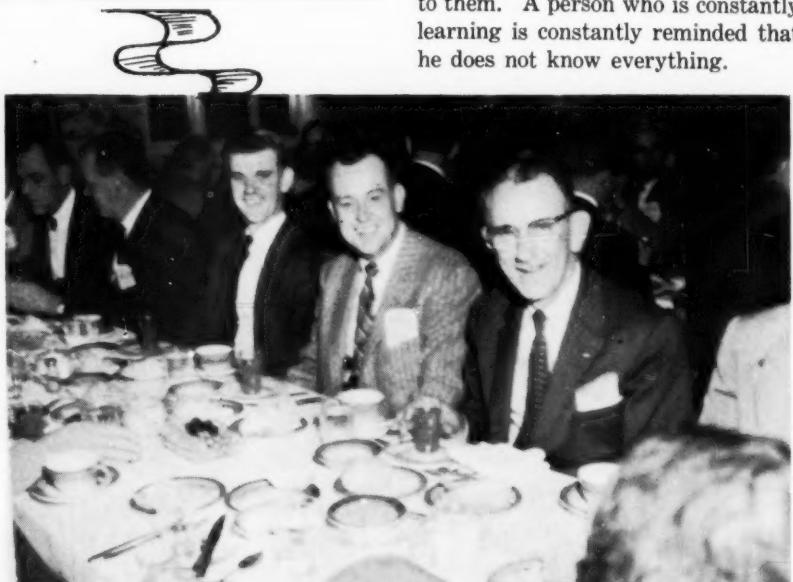
Left: C. B. Tillson, Supt. Crucible Fuel Co.; Martin Valeri, Asst. Supt., C. J. Lindstrom, Chief Eng., and M. M. Fitzwater, Gen. Asst. Mine Foreman, all with the Buckeye Coal Co.



Knowledge keeps a person actively aware of what he does not know. Knowledge also gives an individual new material for his response to life.

Ignorant people tend to be closed minded, they belittle or condemn those who search out new knowledge and they refuse to learn about new things that may upset their own precious position.

Extended knowledge broadens the world in which we live. It permits us to move less awkwardly and less guardedly and it becomes part of our security, rather than insecurity. Increased knowledge makes us warm toward new ideas rather than hostile to them. A person who is constantly learning is constantly reminded that he does not know everything.



Some men in our industry, men holding positions commanding respect, are saying that coal mining cannot be made automatic. When such a statement is made one wonders what the speaker means when he refers to automation. Does he mean that one man can install machines in a coal mine in southern West Virginia, go to an office in New York City and operate the entire mine through push-button and television controls. Or does he mean that a man trained in electronics would oversee the operation of two full face continuous mining machines automatically cutting 500 or 1000 foot faces on each side of an entry conveyor in retreat mining. In most cases men would be needed to move

roof and in some mines roofs could not be held. It is our duty to find mining conditions that would permit longwall mining to get started in automation at the face, then gradually improve it to meet other conditions. After millions of years of trial and error nature finds it necessary to bring life onto this earth starting with a tiny embryo and requiring it to gradually develop into a fully developed animal or plant. Man is a product of nature. To expect man to

matter, the designing and redesigning of machines and the expenditure of millions of dollars.

The Fourth Annual General Meeting of The Mining Electro-Mechanical Maintenance Association was held at the Mountain View Hotel, near Greensburg, Pennsylvania, Saturday, October 6th. This Association is devoted to the furtherance of the safety and efficiency in mining through better maintenance of equipment. The general session was opened at

#### Manpower and Education

The shortage of educated manpower has been a matter of increasing concern to industrialists and educators. The concern will undoubtedly continue, for our more and more elaborate technology demands that an increasing proportion of the people should become educated to their maximum capacity.

Recently the Subcommittee on Research and Development of the Joint Committee on Atomic Energy held hearings on the shortage of scientific and engineering manpower and has since reported some of its findings and recommendations. The subcommittee wisely recognized that the shortage of scientists and engineers is only a part of the problem and that an over-all increase in the number of trained people in all fields would be



Left: Herbert Gall, Harry Miholland, Russell McKinnon, all with the National Mines Corp.; Richard Shaw, retired; Ben Martin, Martin Supply Co.; A. L. Johnston, President, The Elreco Corp.

bring forth a fully developed automatic mining system to meet all conditions without trial and error is utterly ridiculous. To say that automation will not work in coal mines when we already have automatically operated conveyor lines is sheer nonsense.

To carry this argument of no automation further, let us take a poll recently conducted by my most worthy contemporary. We now know that polls are unreliable, for many reasons. To make the coal industry automatic will require minds of the type that are found once in every million people. On that theory, with one half million people in the industry, we would get one half of one of the many minds required. A poll in such a situation cannot give even an inkling of the facts. Automation is not going to come about by polling the industry. Automation will come about only by the severe use of gray



Left: John Park, Mosebach Electric Co.; W. P. Smith, Supt. Colver Mine; and Merle Campbell, Master Mechanic, Eastern Gas & Fuel Associates. Right: H. S. Hensel, Master Mechanic, Conemaugh Mining Co.; A. Shachkoski, Gen. Supt. Leechburg Mining Co.; O. A. Schwamke, Eastern Sales Mgr., Hulbert Oil & Grease Co.

3:30 P. M. by R. S. James, President of the Central Advisory Council, who stresses the need for education in the coal industry. The kind of education talked about by Mr. James has been very ably covered by the following Editorial in the September 28, 1956, issue of SCIENCE.

in the national interest. A recurrent theme in the hearings and one that is emphasized in the report is that the quality and quantity of instruction in mathematics in our high schools is of such fundamental and general importance that vigorous action should be taken to improve

mathematics teaching and to strengthen the place of mathematics in the curriculum.

The subcommittee proposed that a remedial program should have the following requirements: early identification of able students and the provision of courses that would engage their interest and stimulate their minds; encouragement of able students to continue education beyond high school; removal of economic barriers to education; improvement of the supply of high-school and college teachers; better use of available talent in industry, defense, and education; improvement of in-service training in industry.

Numerous recommendations were made on how these requirements might be met. Among them were

consideration little effort has been made to criticize them, to appraise their possible effectiveness, and to fit them into a suitable pattern. Nor have the hearings brought out as yet any careful appraisal of the educational role of the Federal Government in relation to that of state and local governments.

Nevertheless, it is good that the hearings have been held and the recommendations put forward, for these activities mark the first steps in the

"The Coal Mine of 1976," by J. M. Woerner, Consulting Mining Engineer of Pittsburgh was similar to his paper presented at the Pittsburgh Coal Mining Institute Meeting at California, Pa., about 15 months ago. The paper predicted 4,000 tons per year per miner. Thirty dollars per day will be the wage. AC-voltage will be used. No automatic mining will be developed. Television will be used. One out of four men will be maintenance men and maintenance



**Left:** Ben Walburn, Chief Master Mechanic; C. S. Titus, Chief of Supplies; Matt Blair, Supt., and Thomas Park, Director of Safety, all with the Jones & Laughlin Steel Corp.



**Left:** M. E. Altimus, Director of Training, Frick District, U. S. Steel Corp.; J. H. Fleming, R. A. Huth, Universal Welding & Metals, Inc., and Chairman of General Sessions; Bill Hess, Gen. Supt., Jones & Laughlin Steel Corp. and Toastmaster.

better pay for high-school teachers; an educational reserve made up in part of properly qualified men and women from industry who would be released at full pay for high-school teaching and in part by people recruited from the ranks of the retired; and federal support for scholarship programs.

These are clearly preliminary recommendations. At this stage of the

fact-finding procedure that Congress normally uses as a basis for legislation.

"Coal 1776 to Now" was the subject of the first paper, given by D. C. Jones, Director of Mining Extension, Penn State University. This paper covered the discovery of coal in America, early history of the industry, including anthracite, and growth of mechanized mining.

men's jobs will be used to help attract investment. Mining personnel will come from trade schools, rather than from colleges and universities.

"Atomic Influence on Coal Mining" was outlined by J. E. Elkins, Manager, Mines, Duquesne Light Co.

"Mining Education in the Future," was the next paper on the program but was not presented because the author did not believe there was enough time and did not want to cut in on the time devoted to cocktails before dinner. The decision not to read that paper which was to cover a subject uppermost in the industry today did not seem to set well with the men who gave up their time and travelled to the meeting. It made one feel he was short changed in order to allow time for something that could have been done just as well or better after the meeting adjourned, or done at some other time, some other place.



Lima 2400 stripping overburden at the Clark & Krshmeyer Coal Co., Portersville.



Allis-Chalmers Model HD-21 Tractor moving overburden at the Clark & Krshmeyer Coal Co.



Model 44, one yard Lima Shovel loading out coal at the Clark & Krchmeyer Coal Company at Portersville, Pa.

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# FATIGUE REDUCTION...

by ERNEST W. FAIR

## For the COAL COMPANY EXECUTIVE

"Does that tired feeling come over you every afternoon even though there's still hours to go? Do you feel like throwing up your hands and calling it a day when there are still a lot of things which must be done? Then take \_\_\_\_\_."

We'll cut off the patent medicine spiel at this point. Patent medicines designed as "pepper uppers" may have their place and certainly a lot of business executives get a lift out of them BUT there are many other ways to cut down fatigue in one's day.

The readist system would be to cut one's work in half but there is hardly a coal company executive in the land who can follow such procedure and survive the dissection.

Our other alternative is to make adjustments in our business routine which can reduce the fatigue connected with the job. Following these will not only enable us to get the work we have to do accomplished properly, cut down the number of bad decisions we make during the last half of the day but also go home to the little woman in a much more amiable frame of mind.

Here are some steps taken by a number of executives whose routines we have studied in order to discover how they have eliminated the fatigue

problem in their own jobs. Those used by the greatest number of men most often and which can be adapted to the routine of any individual, are presented herewith.

**Break up dull routines.** Fatigue comes from driving, hard work under pressure. It also comes from hour after hour application to dull, but necessary, routines. Too many successive hours of such routines can break the mental and physical stamina of any business man. Breaking up such dull routines with lighter, less exacting or more pleasant chores will help to reduce fatigue from this source.

**Improper work clothes should be avoided.** A lot has been written about comfortable clothes for the man in the factory, people in stores and working girls in offices, but very little has been done to appraise the executive that he too must wear proper working clothes.

Ill fitting or tight shoes, to cite one example, can really pile fatigue on a business man's shoulders. A too tight belt around the waist, the wrong sized under garments, etc., can each do its part toward making our average work day an unpleasant one.

**Misuse the eyes**—That's one of the most prevalent causes of fatigue. Many executives found that where they had been careful to provide proper lighting, etc., for their associates, it had been completely neglected in their own personal use on those parts of their job where required.

Note that the word is "misuse" and not "overuse." The latter is



supposed to be the most common cause of such fatigue. Optometrists who have a large clientele of business men point out that while both causes of fatigue exist the man with the latter is much more apt to do something about it than the one with the former.

Where it is fairly obvious such misuse is helping to bring on fatigue it can often be corrected by better and more uniform illumination in our own office and when we plan this we should consider the whole visual field of the area in which we work and not just the desk top.

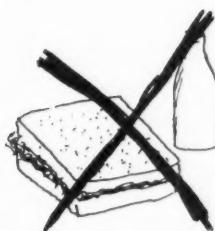
**Watch that body temperature.** That's important too . . . when we work under the right body temperature fatigue has less chance to build up. Still air in our working space is our greatest enemy in this respect for it interferes with the normal regulation of body temperature.



**Taking rest periods during the day.** Many executives were made aware of the value of this procedure when they followed the example of their staff and took "coffee breaks" along with that staff.

They found that a policy of several additional "rest breaks" if for no more than five or ten minutes at a time materially helped reduce their own personal problem of fatigue.

Fatigue is always brought on by built-up nervous tensions and the effects these have on our whole physical being. If we can keep nervous tension from building up during the day we reduce the possibility of fatigue. One way many executives do this is to take those frequent rest periods . . . either at regular intervals or whenever they feel such tension building up.



**Proper nourishment.** Restaurant men tell us that the average business man gives less attention to securing proper nourishment for his day's work than the average girl who works in an office. The executive body must have its proteins, calories, etc., for proper fueling during the day; if it fails to receive them "that tired feeling" comes about long before mid-afternoon.

**Pace yourself.** "One day, tired and exhausted, I was looking out of my office window and started thinking about my college days as an athlete," one executive told us in suggesting this point, "and I remembered how my coach used to keep hammering away at us that we had to learn to pace ourselves properly to keep alert and fight fatigue."

"It worked for me then at athletics so why shouldn't I apply it in my business life? Then and there I decided to try it and doing so has kept me up to standard all through the day ever since."

Learning to pace oneself is a hard task. It takes a lot of planning of the business day at the start; afterwards such pace setting will come almost automatically, we have been told.

The motion picture typing of a business man as the individual who goes at break neck speed all through the day may satisfy a desire of the movie goer but it's far from a true picture. The business road is lined with the wrecks of men who forgot the important factor of pace.

"Develop a personal schedule chart," is advice offered from several business men who are today never troubled with the fatigue problem and are accomplishing more than ever before.

Practically all of one's business chores can be anticipated although the exact details usually remain hidden. Every business man knows that he must give so much time to this chore, so much to that and a given amount to one of many others during the day. These can all be set up on a schedule.

The first such chart will merely serve to tabulate the schedule. From this we can then re-arrange such tasks so that particularly trying ones do not follow each other, i.e., provide "breathers" between the strenuous jobs. Several executives found, with such an analysis, that some of these chores could also be combined with one another. A number discovered that they were doing chores which could as well be handled by subordinates and adding needlessly to their daily work load.

**Watch those working positions.** Another frequent cause of executive fatigue (and most often overlooked) is our working in cramped or restricted positions. Such situations exact a terrific toll on any individual's muscles during only a few hours at a stretch. Added up over an entire day they can be most damaging.

Working at a poorly designed desk, a mis-matched chair and desk, on a desk or chair of improper height, with poorly placed arm rests on one's work chair, etc., are just a few specific examples. With these in mind we can make a thorough checkup of our own individual working area and probably discover several others which add to our fatigue problem.



**"You can work too long and too much,"** a number of executives told us, "and when you forget it you're not only asking for an extra load of fatigue to carry but you are invariably shortening your life span as well.

"There are limits to what any one man can do and how long a period of time in a given day he can devote to his work. The quicker any man recognizes this the sooner he will become a better executive than he is today."

There are other factors such as working under nerve wrecking noise conditions, working with too much emotional tension, etc., which we can avoid in our program of reducing fatigue in connection with our own jobs. All are worth searching out so that we can either be rid of them or take corrective steps to reduce their effect.

Fatigue always defeats any business man's doing his job properly. The tired coal company executive is invariably an inefficient executive.



This National Torque Converter transmits 500 hp. to the 5½-yd. dipper of a Lima 2400 shovel used for removing rocky overburden in a coal stripping operation of H. E. Drummond Coal Co., near Jasper Ala. Don Drummond (right) with W. M. Phillips, G. C. Phillips Tractor Co., Birmingham.

"Delivery of power through a torque converter to the dipper of our 5½-yard power shovel makes a big difference in the strains on the machine when removing rocky overburden in our coal stripping operation," it was reported recently by Don Drummond, H. E. Drummond Coal Co., Inc., near Jasper, Ala.

Although comparisons of working speeds are made difficult by the fact that the new shovel has slightly more than twice the power and dipper capacity of the formerly used 2½-yard, mechanically driven shovel, removal of overburden has been considerably more than doubled. This is indicated by the

fact that the removal rate was increased from the range of 1000 to 1500 yards daily to a range of 2500 to 4000 yards daily.

The new shovel has been used the past several months to uncover a coal vein over which there are 30 to 35 ft. of overburden. In the overburden is a 12 to 14-ft. layer of solid blue granite sandstone from which rocks up to 25 tons and more are produced by blasting. "Despite these conditions," Mr. Drummond said, "we are able to maintain steady production with no engine stalling and minimum maintenance costs. Our present daily production is 400 to 500 tons of bituminous coal in a 16-hr. day."

Most interested observer of the operation of this shovel is W. M. Phillips, vice president, G. C. Phillips Tractor Co., Inc., Birmingham, a representative of 20 major manufacturers of road building and contractors' equipment and supplier of this equipment. Power shovels without torque converters will be obsolete within a few years in his opinion. In fact, he reported that 14 of the 15 power shovels that his company sold last year were equipped with torque converters.

The National single-stage torque converter, recently made available by National Supply Company, Pittsburgh, in this field after three years of successful heavy-duty operation on oil well drilling rigs, was introduced on the Lima 2400 shovel. Its first use on a Lima shovel was by Drummond Coal Co. It has proved to be "the best-engineered converter in the field, with less slippage and faster pickup than the others we have seen," Mr. Phillips said.

"Torque converters make operation of the equipment easier, reduce maintenance, and increase production rate. A machine that is equipped with a torque converter always

# POWER

has a greater bail pull at any given speed than the equivalent mechanical drive machine and the maximum operating speed of the converter-equipped shovel is always higher than that of a mechanical drive shovel.

"The big problem with power shovels driven through other types of transmissions has been the kinetic energy or flywheel effect of the engine's rotating parts in producing shock loads on the drive mechanism when the shovel dipper strikes an immovable object, thus stalling the engine without any protective cushion, causing cables to snap, and fatiguing the gears. The result is high maintenance,

more down time, and less production.

"With a torque converter any loss in line speed when the dipper is restrained by increased load, causes a considerable increase in line pull. Engine speed increases automatically, producing more horsepower, and torque is multiplied automatically to increase bail pull and handle the increased load. It is almost impossible to transmit kinetic energy forces to the rest of the machine if the bucket is suddenly stalled.

"In the language of the contractor, this means that the dipper may be stopped for a moment by some heavy object in the ground, but instead of stalling the engine, or jerking and pawing at the earth, the shovel steadily increases its power, easing through material that blocks the dipper. If a rock is immovable, the shovel builds up to its maximum governed engine speed, and the torque converter output shaft builds up a maximum torque. These conditions hold until the operator releases the dipper to try another attack. Thus, in spite of any im-



Torque Converter Transmission of 500 hp. to the 5½-yd. dipper of this shovel has greatly reduced strains on the machinery in removing rocky overburden by Drummond Coal Company near Jasper, Ala., and speeded up the operation. On this shovel is the first of National Supply Company's heavy-duty torque converters to be used outside the oil industry. The converter is shown through the open door at the rear corner of the turntable. This shovel has a 52-ft. boom and 45-ft. dipper stick, wt. 500,000 lbs.

## *with* TORQUE CONVERTER

movable object in the path of the dipper, the engine continues running instead of being stalled."

The engine for this shovel is a diesel of 500 hp. with a high idle speed of 1340 rpm, and a tail shaft speed (after the torque converter) of 850 rpm. Maximum normal speed setting for most shovels is 1200 rpm. at which the converter stops building up torque. As speed drops during engine operation, torque performance efficiency is lowered, but with the National torque converter, maximum efficiency can be maintained under extremely difficult conditions, Mr. Phillips said.

Fluid couplings have not been

successful in solving the shock transmission problem. The shock absorption ability of the fluid coupling drive at high speed is practically nothing because the input and output members of the coupling are practically locked together with the incompressible hydraulic fluid. Consequently kinetic energy of rotating engine parts can be transmitted to the rest of the machine if the dipper is suddenly stalled because the fluid coupling will also permit the engine to stall if operated at maximum speed at the time the dipper is blocked. This means that a fluid coupling is no better than a straight mechanical drive when the engine is being operated

at peak efficiency, or maximum torque.

Although the most important operation powered on a shovel is digging, other operations are also performed through the torque converter: closing the dipper door, hoising and lowering the boom hoist, raising and lowering the dipper hoist, advancing and retracting the dipper, crowding the dipper, swinging the whole unit around, and driving the travel mechanism for overland movement. In all of these operations, Mr. Phillips concluded, the National torque converter affords maximum efficiency in power transmission from the diesel engine.

Several years ago Consolidation Coal Company (Ky.) opened its Marshalls Branch Portal six miles from Jenkins. This portal was situated near the center of Mine 204 workings, but the coal still had to be hauled approximately five mile to the Central Preparation Plant. Along this haulway a ventilation problem was encountered. The exhaust fan at point "A" ventilated the haulway positively up to point "B," and the exhaust fan at point "C" ventilated the haulway positively up to point "D," but the haulway from "B" to "D" had air going in either direction at various times, and had sluggish air velocity at other times. How to provide a definite flow of air for this haulway was the problem.

A study was made to determine the best means of solving the problem. The headings along the haulway were checked to devise a means if routing the air from "B" or "D" or both points, to supply a substantial amount of air, but numerous stoppings would have had to be erected or repaired, and two expensive airways would have had to be driven, the total estimate being at least \$8,000.00, not including the added power cost to pull the air along the haulway. The airways on either side of the haulway were, in general, badly fallen and choked.

After further study, it was decided that if a means of supplying air from the outside near the center of the distance from "B" to "D" could be provided, the problem could be solved cheaper than otherwise. At point "E" there is only about 65 feet of cover, so this was the most logical point. The cost of a slope or extremely long drift was found too high; so a shaft was determined to be the best. Further study indicated that a vertical core drilled shaft would not only be lower in cost, but had the advantages of maximum area for a minimum amount of excavation, no lining needed, the smooth sides are stronger and offer less resistance to air travel and a circular shaft has high resistance against side pressures.

An intake at this point would provide a shorter air travel resulting

## *sinking a shaft by*

Presented to

44th NATIONAL SAFETY CONGRESS AND EXPOSITION  
Chicago, Illinois — October 24, 1956

By DAVID A. ZEGEER

Assistant to the President, Consolidation Coal Company (Ky.)  
Division of Pittsburgh Consolidation Coal Co., Jenkins, Ky.

in a power savings. Also, looking ahead eight or ten years when the reserves of Mine 204 are practically depleted and the barriers are being mined from "A" to "E," the workings could be ventilated by the intake at "E," air being pulled by the fan at "A." When the barriers between "E" and "D" are being mined, a fan could be set on the air shaft and pull air out at this point, a substation being nearby to provide the needed power.

Such shafts have been placed in the metal mining districts, where it is understood that the idea originated. A similar method of drilling was employed in sinking two 36-inch shafts for the McLain Fire Brick Company in Ohio, and a 48-inch hole was drilled for the Lorain Coal & Dock Company at their Blaine Mine in Ohio.

The low cost and other advantages of an air shaft at point "E" out-

weighed any other method of solving the problem; so a contract was let to the Mott Core Drilling Company of Huntington, West Virginia.

The first step in sinking the shaft was to pregrout the strata. Pregrouting was necessary to fill cracks and crevices in the strata to keep water from flowing into the mine and prevent freezing in the winter time which would result in rapid deterioration of the shaft walls. Since a swamp is nearby and water seeped into the mine at the shaft site, encountering water would be certain without pregrouting. A mixture of eighty gallons of water and ten bags of cement was made in a grout mixer and was pumped into the grout hole, which was a regular 3-inch diamond drill hole, drilled down to 50 feet on the spot where the shaft was to be. (The cover at this point is 63 feet). One hundred and fifty (150) bags of cement were used in the first hole,

# CORE DRILLING

but before a pressure over 100 psi. could be maintained the grout began seeping out of a crack in the surface; so a second grout hole was drilled down to 55 feet. Ninety seven (97) bags of cement were pumped into the second hole and the pressure reached 600 psi. which assured a well grouted strata.

The next step was to install a 50-inch inside diameter rolled steel casing 5/16 inch thick. A 7-foot hole was dug by hand; then a mud bit was used. The rotation of this bit caused water pumped into the hole to mix with the surface dirt, and this mud was pumped out. The rocks and pebbles washed free from dirt were loaded out by hand. Being in a swampy area, it is obvious that the overburden had no structure whatsoever; so, in order to get the 50-inch casing down to bedrock with a wall of cement around it, it was necessary to first put in a larger casing to keep

out the muddy and sandy overburden. A 60-inch casing, 1/8 inch thick and 10 feet high, was worked down to bedrock at a depth of 15 feet and 29 bags of cement were put into the bottom to level the sloping bedrock and help keep out water.

Next, the actual drilling started; the cutting was done by the rotation of a short barrel, using chilled steel shot under the edges as a cutting medium. About one quart of shot was used in drilling each 5 feet. The shot barrel rotated 60 rpm. The 48-inch hole was drilled down to 19 feet and reamed to a diameter of 56 inches so that the 50-inch casing could be put in and projected one foot above the ground. Four 5-foot sections were welded together while being lowered into the hole; then a mixture of cement (205 bags) and water was poured between the two casings, over top of the outer casing and one foot

deep in the bottom to insure sealing off water and again making a level surface upon which the shot barrel could resume drilling.

With the 50-inch casing installed, drilling of the 45 feet of strata began. This work took 15 days, single shifted. After a core was drilled, the shot barrel was removed from the hole and an expansion bolt was put into the core and the core pulled out in sections about 2 feet thick. (The largest core pulled was 3 feet thick.) A core could be broken by putting tension in the lifting cable and discharging 1/4 of a stick of permissible powder along the side of the core. Some shale cores had little structure and had to be loaded into a bucket by hand.

Five feet of rock could be drilled in four hours, but it took a little more time to pull the core. Shale and sandstone were not hard to drill, but oddly enough it took longer drilling through coal because the shot worked its way into fissures in the coal. Five pockets of fireclay in the wall of the shaft were reamed by hand and filled with cement flush with the circular wall of the shaft.

Walls of shafts can be lined with steel casings, gunite, cement, paints, and plastics, but no covering was put on the wall of this shaft. Although two-thirds of the strata is shale, what little does air slacken and fall into the mine during its relatively short life will not present a serious problem.

The hole drifted 16 inches in a total depth of 63 feet-8 inches or approximately 1 inch per 4 feet of depth.

Once the shaft was completed, two 4-foot sections of 50-inch casing were welded on top of the installed casing and covered with a heavy screen to prevent any person or animal from falling in and to keep objects from being thrown into the mine. Also, the casing will prevent flooding the mine by a possible flash flood. This extra casing was much cheaper than installing any suitable type of fence around the shaft plus drainage ditches and the ensuing maintenance cost.

Cost of the completed shaft was as follows:



#### Mott Core Drilling Co.

Grout hole No. 1---50 ft.  
Grout hole No. 2---55 ft.

Drilling Rig boring hole for portal in  
Western Pennsylvania by Pennsylvania  
Drilling Co.

105 ft. @ \$3.50 per ft .....	\$367.50
Pressure grouting (lump sum) .....	250.00
63'-4"-48" hole @ \$60.00 per ft. ....	3800.00
10'-0"-60" casing .....	137.22
20'-0"-50" I. D. casing @ \$22.50 per ft. ....	450.00
8'-0"-50" I. D. casing @ cost .....	162.65
Hauling 8'-0" casing .....	97.50
Installing and welding 8'-0" casing .....	67.00
	\$5331.87

#### Consolidation

Bulldozer fuel .....	\$ 11.56
Cement .....	330.00
Wire covering .....	21.00
Labor .....	42.15
	404.71
Estimated misc. expense .....	80.94
	\$ 485.65
TOTAL COST 63'-4" shaft .....	\$5817.52
Cost per ft. of depth .....	\$ 91.90

It can readily be seen that the average cost of approximately \$92.00 per foot of depth would be lower had the depth of the hole been greater. In other words, the deeper the hole, the more the cost approaches \$60.00 per foot or depth. To sink a shaft 6'x6' inside a timber lining by conventional methods of shaft sinking was estimated to cost:

Sinking 62'-4" at \$88.00 per vertical foot	\$5573.33
Timber lining 63'-4" at \$36 per vertical foot	2280.00
	_____
	7853.33
Grout off water at 10% of cost	785.33
	_____
	\$8638.66

The cost for Consol to level the area and build a fence around the shaft would be:

Bulldozer fuel and labor ----- \$25.00

Fence

Material ----- \$300.00

Labor ----- 250.00

Contingencies ----- 50.00 600.00

\_\_\_\_\_

625.00

Total cost 6'x6' shaft would have been -----

Per ft. of depth

\$9263.66

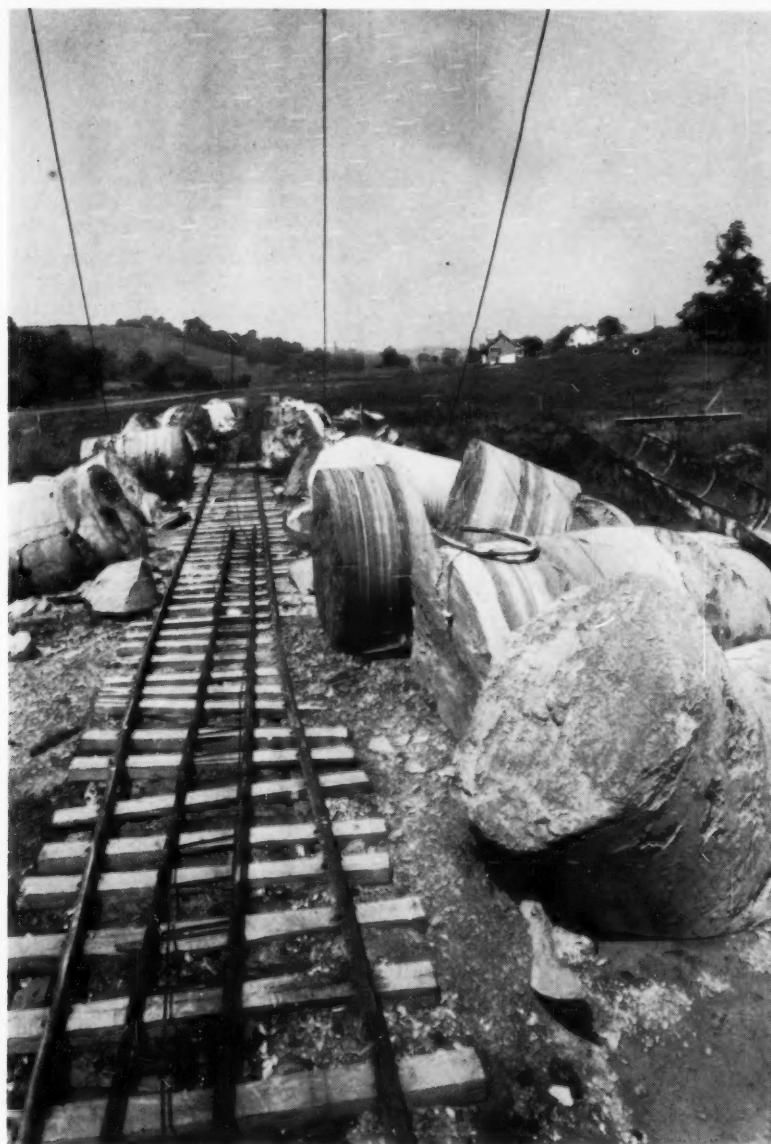
\$ 157.40

The cost to sink a 4'x4' shaft would be approximately the same as a 6'x6' shaft but the bidding contractor has never before sunk a 4' shaft. Thus, it can be noted that a shaft of this type would have cost 60 per cent more than the method used, and if the shaft had been deeper, the difference in cost would be even greater.

Due to the badly fallen entries and other inside conditions it was not considered possible to sink the shaft by means of lowering the muck through a pre-drilled 14 or 16-inch hole into mine cars below.

The changes in ventilation because of the shaft are very satisfactory. From 8,000 to 10,000 cfm. enters the shaft and positively ventilates the haulway in both directions at all times. If more air were needed, the intake could be substantially increased by a minor change near point "A." At the shaft bottom there is a water gauge pressure of .03 inches.

It may be said that besides having the advantage of a circular shaft as mentioned before, a core drilled air shaft is a fast method of shaft sinking and much more economical than the conventional method.



Cores from the drilling operation.

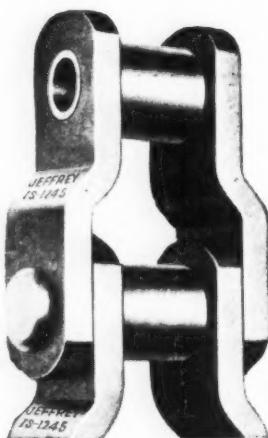
Forget to turn off your car lights? Arthur B. McKaig of Seattle, Wash., has invented a small device that screams after you to tell you that "electrical energy is being consumed needlessly". Mr. McKaig was granted patent No. 2,756,408, and assigned the patent rights to McKaig Electronics, Inc., of Seattle.

Special features: cadmium-plated to resist corrosion; clamp halves, size for size, match perfectly; bolt holes assure constant center distances for true lineup of holes; bolt-head hex-shaped recess eliminates need for two wrenches; hose insert prevents restriction of hose I.D.; clamp retainer assures positive grip; all sharp edges are eliminated; bolts are of high-tensile steel.

The Weatherhead Company, Fort Wayne Division, Fort Wayne, Indiana, announces a new clamp-type hose end which provides maximum versatility in high-pressure lines for air, hydraulic fluids, steam. Couples readily on other types of hose. Meets practically any original equipment of field replacement hose-end need. Requires no hose skiving or special tools. May be used over and over. Of Malleable iron, this new clamp-type hose end assures free flow and positive, long-lasting seal. Sizes are available in  $\frac{1}{4}$ ",  $\frac{3}{8}$ ",  $\frac{1}{2}$ ",  $\frac{3}{4}$ ", 1",  $1\frac{1}{4}$ ",  $1\frac{1}{2}$ , and 2".



Suggested fields of application: hydraulic machinery used in construction, farming, materials hand-



## JEFFREY CHAIN IN STOCK

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quickly? Standard  
parts carried in stock

**JEFFREY CHAIN** has maximum strength . . . minimum weight . . . and added reserves for long periods of normal wear plus shock from unexpected overloads. Northeastern and Zanesville Supply Companies are also headquarters for MacWHYTE Wire Rope, DIAMOND Roller Chains, Sprockets and Flexible Couplings, CONVEYING Idlers, Belting, and all sizes and types of BRAKE LINING and friction materials.

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ling, transportation, excavating, drilling, mining, manufacturing, air lines used on compressors, drills, hammers, tampers, vibrators; steam lines on equipment in chemical industries, food processing, cleaning, manufacturing.



C. T. (Clyde) Millikin has been made Sales manager for the Allegheny Machinery Sales Co., Inc. He attended the University of Missouri and served in the Southern Pacific Combat Engineers for three years in the last war. He has been with Allegheny Machinery Sales Co., Inc., since its conception.



Louie Donahue has been added to the sales staff of the Allegheny Machinery Sales Co., Inc. Mr. Donahue was formerly with the Penna. State Police Dept. and later with the Brake Engineering Co.

**USED EQUIPMENT**

**Item 555-B157**—Caterpillar D8 Tractor with LeTorneau Bulldozer and LeTorneau Single Drum Power Control Unit. Has worked approx. 30 days since new track assemblies, sprockets, and track roller assemblies, were installed. Balance of tractor in good working condition.

\$6,880.00

f.o.b. Bradford, Pa.

**Item 556-WV186**—Caterpillar Model D8 Diesel Tractor with Cat No. 25 Cable Control Unit and Cat 8A Bulldozer. Installed new track adjusting bolt and nut, new cutting edge, rebuilt rollers, one new track roller frame dirt guard. Repaired final drive pinion and flanges; one new pinion and all new bearings and seals; relined brakes, ground valves on starting engine and diesel engine, new H. D. fenders. Unit in excellent condition.

\$17,500.00

"Certified Buy"

f.o.b. Clarksburg, W. Va.

**Item 856-P492**—Caterpillar D8 Tractor with No. 25 Cable Control and 8S Blade. Pins and bushings turned in track links; oil cooler repaired; new hood and sprocket guards installed; operating clutches adjusted 2987 hours on hour meter.

\$19,500.00

"Certified Buy"

f.o.b. Pittsburgh, Pa.

**Item 856-P190**—Caterpillar D7 Tractor with Cat No. 25 Cable Control and Straight Blade. Replaced moldboard; replaced cutting edge and end bits; installed new carrier roller; tracks are 90% of new; installed one new sprocket; replaced seals and bearings in final drive; replaced pin on seal and one new flange; installed new seals and bearing in transmission; reconditioned steering clutches; installed new master clutch; tuned starting engine; serviced diesel engine; bottom rollers are good.

\$13,000.00

"Certified Buy"

f.o.b. Pittsburgh, Pa.

**Item 756-WV197**—Caterpillar D7 Diesel Tractor with LeTorneau Straight Dozer and LeTorneau Rear D.D. Cable Control Unit.

\$4,000.00

"As Is, Where Is"

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MACHINERY COMPANY**

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1356 E. 12th Street, Erie, Pa.  
E. Broadway, Farrell, Pa.  
Buckhannon Pike, W. Va. Route 20 (So.),  
Clarksburg, West Va.

### NEW ELECTRIC ROTARY HAMMER USES SHOCK WAVES TO DRILL 40% FASTER

The Demo-Haines Tool Corporation of Enid, Oklahoma, has just announced the development of an unusual, new portable electric rotary hammer which uses shock waves to drill faster than ever thought possible.

Creating over 36,000 shock waves a minute, it cuts a clean, true hole up to 40 feet in depth through the hardest stone, rock or even reinforced concrete. Weighs approximately 10 lbs. Requires no pressure. Difficult overhead or horizontal work is handled with remarkable ease. Designed for drilling 3/16 in. up to 1 1/2 in. diameter in concrete or masonry for steel pipes, slug-ins and electrical installations. The Demo-Haines High Frequency Portable Electric Rotary Hammer is absolutely the latest in specialized engineering, featuring a new high speed water and air swivel.

Each part is precision engineered and fabricated from high quality heat-treated steel. Powered by a rugged Thor-built electric motor which operates on regular 115 volt AC or DC current at 1000 RPMs. No transformers or rectifier required. Ground hardened shafts operate on grease sealed ball bearings which insure long life and practically maintenance-free operation. Hammer measures 16 inches and delivers 6000 BPM. Lists for \$235.00 plus bits. For further information write: Demo-Haines Tool Corporation, North 10th Machine Works, Enid, Oklahoma. Dealers and distributors inquire.

Edward G. Fox, former President of the Reading Anthracite and now President of the Bituminous Coal Operators Association has been awarded a distinguished Alumnus Award by The Pennsylvania State University.

- A new unit in its rotary drill line is announced by Davey Compressor Co., Kent, Ohio.

Designed as Model M-8AL, and equipped with a special long drill bar and mast, it can drill 24 feet ledges without changing steels.

Suitable for mounting on any standard truck, the unit utilizes both compressed air and high pressure water for drilling. It has a rated capacity of 6 1/4-inch holes up to 600 feet with air and 1,500 feet with mud. In operation it is said to effect substantial savings in drilling costs.

Compressor for air blast drilling is a Davey 500 c.f.m. unit. High pressure water pump is heavy duty duplex type. Compressor and pump are driven by a GMC-471 engine mounted on the truck bed. A 5-speed transmission permits operation of the drill at its most efficient speed.

The new Model M-8AL is recommended for shot and blast holes, structure testing, core drilling, etc. It is also suitable for water well drilling. Weight of the complete unit, as illustrated, is approximately 26,000 lbs.

For specifications, literature, and full details, write Rotary Drill Division, Davey Compressor Co., Kent, Ohio.

William H. Ritter was elected president of the Central Pennsylvania Coal Producers' Association and of the Eastern Bituminous Coal Association at a joint meeting of the groups this week at Bedford Spring, Pa. Ralph H. Moore was elected vice president; Walter A. Jones, treasurer; C. P. O'Neill, assistant treasurer; and Krank G. Smith, counsel. Robert T. Laing was reelected executive director and secretary.

**FOR SALE**  
10 inch water pump. 65 hp., P & H Diesel Engine, mounted on skids.  
**CONTE EQUIPMENT CO.**  
Monroeville, Pa.  
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**MANITOWAC**  
4500 Stripping Shovel 60 Ft. Boom, 45 Ft. Sticks, 4 Yd. Dipper. Caterpillar D397 Diesel Engine. Light Plant, Also 5 KW Generator.  
**Anderson Equipment Company**  
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## WE JUST WANT TO MAKE SOME SALES

We Own What We Advertise

Buy from the largest stock of good mining equipment in America. Includes all types of Joy Cutters, Loaders, Shuttle Cars, Cat Trucks, Belt Conveyors, Chain Conveyors, etc.

### JOY EQUIPMENT—rebuilt

- 1—Joy 20-BU Loader, latest type.
- 2—Joy 14-BU Loaders, low pedestal.
- 1—Joy 14-BU Loader, medium pedestal.
- 2—Joy 14-BU Loaders, high pedestal.
- 3—Joy 12-BU Loaders, 9E, latest type.
- 2—Joy 12-BU Loaders, 7E, excellent.
- 3—Joy 11-BU Loaders.
- 6—Joy 8-BU Loaders.
- 1—Goodman 660 Loader on Cats, excellent.
- 1—Joy 6-SC Shuttle Car, rebuilt.
- 4—Joy 8-SC Shuttle Cars, lowest type.
- 1—Joy 5-SC Shuttle Car, rebuilt.
- 2—Joy 32E9 Shuttle Cars.
- 2—Joy 32E10 Shuttle Cars.
- 4—Joy 32E15 Shuttle Cars.
- 1—Joy T-1 Standard Cat Truck.
- 1—Joy T-2-5 Cat Truck, AC.
- 1—Joy T-2-6 Cat Truck with reel.
- 4—Joy 11-B Cutting Machines, like new.
- 1—Joy 7-B Cutting Machine, excellent.
- 2—Goodman 512 Cutting Machines with Bugdusters.
- 4—Goodman Machines on Cats, 31" high. All hydraulic.
- 1—Goodman 512 Cutting Machine, perfect.

### LOCOMOTIVES

- 2—Jeffrey, 20 ton, type MH-110, 42" and 44" Ga.
- 4—Jeffrey, 13 ton, type MH-110, 36", 42" and 44" Ga.
- 3—Jeffrey, 10 ton, type MH-78, 42" and 48" Ga.
- 12—Jeffrey, 6 ton, type MH-88, 42", 44" and 48" Ga.
- 3—Jeffrey, 4 ton, type MH-96, 42", 44" and 48" Ga.
- 1—G. E., 4 ton, type 825 Locomotive, 26" high.
- 10—G. E., 6 ton, types 801, 803, 821 Locomotives, 42", 44" and 48" Ga.
- 1—G. E., 8 ton, type 822 Locomotive, 44" Ga.
- 3—G. E., 10 ton, type 809 Locomotives, 42", 44" and 48" Ga.
- 1—G. E., 10 ton, 829 Locomotive, 36" Ga.
- 1—Goodman, 4 ton, 8-30 Locomotive, 22" above rail.
- 8—Goodman, type 33, 6 ton, 44" and 48" Ga.
- 3—Goodman, 8 ton, type 32A, 36", 44" and 48" Ga.

### 3—Westinghouse, type 902, 4 ton, 42" and 48" Ga.

- 2—Westinghouse, type 904, 6 ton, 44" and 48" Ga.
- 2—Westinghouse, type 906, 44" and 48" Ga.
- 2—Westinghouse, type 907, 10 ton, 44" and 48" Ga.

### TIPPLE EQUIPMENT

- 1—Cedar Rapids portable super Screening Plant.
- 1—Allis Chalmers 5' x 14' Rippflo Vibrator.
- 1—4' x 10' Robbins Gyrex Vibrator.
- 1—4' x 10' Vibrator, three deck, low head.
- Feeders, Drag Conveyors and Loading Booms.

### CUTTING MACHINES

- 2—Jeffrey 29-UC Universal on cats.
- 1—Goodman 312-G-3, 220 AC low vein.
- 4—Baby Goodman 212's, rebuilt.
- 3—Goodman 312's, 18" high.
- 2—Goodman 512's with Bugdusters, like new.
- 15—Goodman 12AA's and 112AA's.
- 10—Goodman 324 Slabbers.
- 2—Goodman 724 Slabbers.
- 30—Jeffrey 35L's, like new, 17" high.
- 15—Jeffrey 35B's and 35BB's.
- 2—Jeffrey 29B's on track.
- 2—Jeffrey 29C's, track mounted.
- 2—Sullivan CR-10's, 15" high.

### LOADING MACHINES

- 17—Joy Loaders, all types.
- 2—Jeffrey 61 CLR's on rubber, 26".
- 3—Jeffrey L-500 Loaders.
- 2—Myers Whaley No. 3 Automat Loaders.
- 3—Clarkson Loaders, 26" above rail.

### CONVEYORS

- 2—Joy 30" Belt Conveyors, 10 to 15 H.P.
- 2—Goodman 97-C's, 26".  
3000' 30" Conveyor Belt.
- 8—Jeffrey 61 AM Room Conveyors, 300 ft.
- 10—Jeffrey 61 HG Face Conveyors.
- 2—61EW Elevating Conveyors.
- 2—61 WH, 15" Room Conveyors, 300 ft.
- 4—Joy Ladel UN-17 Shakers.
- 10—Goodman G-12½ and G-15 Shakers.

### CONVERTERS AND DIESEL PLANTS

- 1—50KW G. E. TC-6, 275 volt Rotary Converter.
- 3—100KW, G. E. TCC-6's, 275 volt, Rotary Converters.
- 1—150KW, G. E. HCC-6's, 275 volt, Rotary Converters.
- 1—200KW, G. E. HCC-6 Rotary Converter, 275 volt DC.
- 3—300KW, G. E. HCC-6 Rotary Converters, 275 DC.
- 1—200 KW Westinghouse Rotary Converter, 275 DC.
- 1—300KW Westinghouse Rotary Converter, 275 DC.
- All above with 6900/13000 and/or 2300/4000 primary transformers.
- 1—65KW MG Set, General Electric, 275 volt.
- 2—150KW MG Set, General Electric and Westinghouse.
- 1—200KW MG Set, Ridgeway.
- 1—Cummins 125KW Diesel with 250 volt DC Generator.
- 1—700 H. P. Shaft Hoist, complete. Complete steam plant, will sell all or any part.
- Boilers, like new, 1100 H. P. and 500 H. P. Also transformers, turbines, etc.
- Complete Tipple with Cleaning Plants.

### MISCELLANEOUS

- 10—Air Compressors, 1 H. P. to 40 H. P.
- 40—Mine Pumps, all types. Pipe, Plastic Steel Transit, all sizes 1" to 6".
- 15—Mine Cars, drop bottom, 42" Ga.
- 150—Mine Cars, 18" high, end dump, 44" Ga.
- 300—Mine Cars, end dump, 20" high, 48" Ga.
- 15—Brown Fayro HKL and HGD Car Spotters.
- 1—12 ton Differential Slate Larry.
- 1—Kanawha Hillside Dump.
- 5—Low vein Water Cars. Incline Hoists, 25 to 50 H. P. Machine Tools for mine shops.
- 400—tons Rails, all sizes.
- 10—tons Copper Trolley and Feeder.
- 300—Transformers from 1 to 2,000 KVA, 110 to 13,000 primary volts.
- 400—Electric Motors, 3 to 300 H. P. Suspension Bridge, 360 ft. long for river crossings.
- 1—International TD-24 Angledozer. Huge stock of mine supplies.

Thousands of other Items

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# J. T. FISH & COMPANY

LOGAN, West Virginia

Phone 2825

• A new type of "wrap-around" base and fuel tank combination has been developed for use with Caterpillar Diesel Power Units and Electric Sets, according to an announcement by Catterpillar Tractor Co.

The new bases have been designed for use with all Cat Engines and Electric sets from the D311 through the D342. Models presently in production include extended and short base versions for Cat D337 (Series F) and Cat D326 (Series S) Engines, a short base model for the Cat D318 Engine and electric set bases for Cat D311 and D315 Diesel Electric Sets. Other models will be added in the near future.

The new bases will replace the steel channel models formerly used. The streamlined, space-saving design will feature a greater fuel capacity, lighter weight and sturdier, more rigid construction.

Primary advantage of the new bases is the ability to withstand the stresses and strains of skidding and dragging. Extreme strength and rigidity enable them to resist the bending, flexing and other distortions to which power units used in the field are frequently subjected.

An additional advantage of the new bases is the added fuel capacity made available by their design. All models of the new bases will have more capacity than was possible with the older tanks. Weight of the fuel tanks included in the new bases will be about the same as that of the channel-type bases alone.

L. Newton Thomas was reelected president of the Kanawha Coal Operator's Association at the annual meeting in Charleston, W. Va. Mr. Thomas is president of Carbon Fuel Co. and of National Coal Association. Harry M. Tibbs was elected vice president; C. C. Dickinson, Jr., was reelected treasurer, and Harry G. Kennedy was reelected executive secretary.



This new LS-98 Link Belt Shovel loads Coal at D. C. Penoyer & Co. operation at Le Contes Mills, Pennsylvania. The coal is of a hard nature, yet this machine loads it out without shooting, using a 1½ yard Esco Coal loading bucket. The picture shows it spoiling small rock left on the coal by the Manitowoc Model 4500 Stripping Dragline.

**NOW - ON THE SPOT FILTRATION ...**

**for all your oil hydraulic systems and machines**

**SCHROEDER FILTER BUGGY**

**It rolls right to the job!**

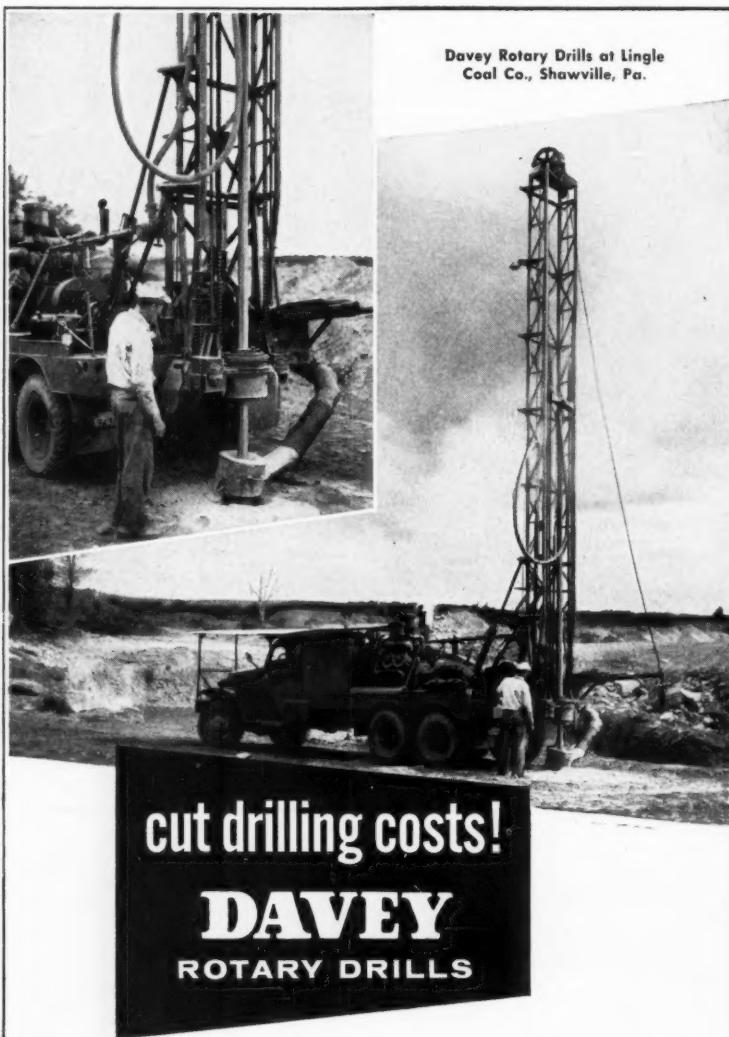
**Protect your hydraulic equipment . . . save oil . . . reduce down time . . . cut repair costs with a Schroeder Filter Buggy. Mounted on rubber tired wheels, the Buggy, only 48½" high x 26½" wide, can be easily pushed from one machine location to another.**

**13,944 square inch filter area!**

The pleated radial fins of the phenolic impregnated cellulose filter furnish 13,944 square inches of filtering area. This highly efficient filter has an initial particle selection of 10 Microns (.00039) and filters out particles so small they cannot be seen with the naked eye . . . however, it will not remove additives nor will it affect chemical or waterbase flame-resistant fluids.

**SCHROEDER BROTHERS**  
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Your request will bring complete information



For faster, more economical drilling . . . increased coal production at lower costs, leading strip operators rely on Davey. Suitable for mounting on any make of truck, Davey Rotary Drills move fast between blast holes . . . are ideal for low cost core drilling with air . . . easy to set in drilling position.

Daveys are available in 6 different models—air blast, mud pump, or combination types. Rated capacities to 2,000 ft. Outstanding features include choice of power take-off or separate power unit operation, automatic hydraulic feed, hydraulic pull down, heavy-duty rotary table, rugged tubular box-type mast . . .

AA-1697

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Manitowoc 4500 Dragline, ready to work, 2 yrs.

Allis-Chalmers 300 KW-MG Set 250 ½ DC

Vulcan 600 hp Mine Slope Hoist, reels 11000 ft. Rope.

Joy 12 BU—AC Loader 440 V., like new.

Manitowoc 3500 Hi Front Shovel, excellent.

Joy 10 RU Cutter on Rubber, 440, 220 AC.

Taylor 2 Deck Vibroleing Screens, type F8, size 6'x16', excellent operating condition.

New Deep Well Mine Pump, 2500 gpm, 70' head.

Jeffrey 24x30 Single Roll Crusher.

Scottdale 18x30 Dble. Roll Crusher.

Joy Shuttle Cars, 42E, excellent operating condition.

Drag Conveyor 24"x33', enclosed and motor.

Westinghouse 100 KW-MG Set and Switch Gear.

2 Sets Coal Truck Scales.

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MACHINERY AGENT  
1200 Woodbourne Ave.**

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# How the Piggyback Conveyor System...keeps continuous mining machines working more hours per shift

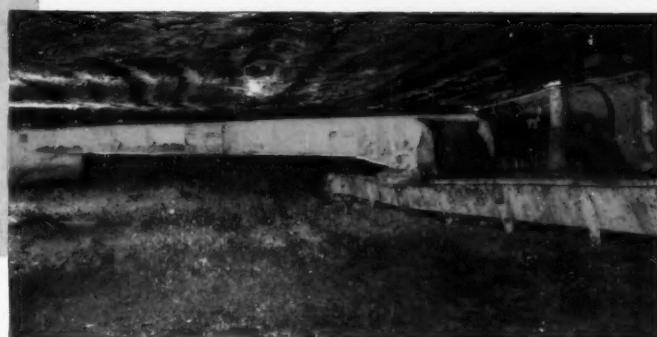


As many leading coal companies already know, the Piggyback Conveyor System is the most practical, most economical method of face transportation for continuous mining. Because it eliminates lost time for car changes, this continuous-flow equipment assures maximum working time at the face—makes it possible for continuous mining machines to operate more hours per shift. Coal is loaded and moved from the face to the outside in a steady, uninterrupted stream *as fast as it's mined*. The result: more tons per man, higher continuous tonnages and less cost per ton.

Whether you're using continuous mining machines or conventional mining units, it will pay you to consider the many advantages provided only by the Piggyback Conveyor System. We'll be glad to supply complete information—without obligation.

## Check these advantages of the Piggyback System for continuous mining

Fewer delays • Higher capacity • Lower maintenance • Fewer men in face crew • Fewer nonproductive men • Less down time • Better cleanup • Better operator attention • Greater concentration of mining • Longer economical haulage distances.



Piggyback Conveyor System in operation, servicing continuous mining machine that has delivered single shift tonnages of over 800 tons. Receiving end of Piggyback is attached to Pigloader loading machine and follows it as it moves.

The **LONG**  
OAK HILL, W. VA.

*Company*

**equipment from**

# Highway

**guarantees lower costs  
... increased production  
and greater profits!**



▲  
**Lima 2400 dragline operated by Robert Bailey,  
Morrisdale, Pa.**

◀  
**Allis-Chalmers HD-21, with Gar Wood  
cable blade, also on Robert Bailey strip job.**

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